T S7/9,K/ALL

7/9,K/1 (Item 1 from file: 15)
DIALOG(R)File 15:ABI/Inform(R)

02329225 86926503
The impact of market risk on property portfolio risk reduction
Byrne, Peter; Lee, Stephen
Journal of Property Investment & Finance v18n6 PP: 613-626 2000 ISSN: 1463-578X JRNL CODE: PRVF
DOC TYPE: Periodical; Feature LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 5161

ABSTRACT: This paper investigates the extent to which risk reduction can be achieved within the UK property market in high and low Beta portfolios. This issue is examined by making simulations of property portfolios of increasing size using the largest sample of actual property returns that is currently available, over the period 1981 to 1996. In particular it is shown that the achievable level of risk reduction is negatively related to the level of market risk of the individual assets.

TEXT: Peter Byrne: Department of Land Management and Development, The University of Reading, Reading, UK

Stephen Lee: Department of Land Management and Development, The University of Reading, Reading, UK

1.0 Introduction

Empirical research has indicated that increasing the number of properties within a fund's property portfolio beyond 20-40 does not, on average, lead to further significant reduction in the systematic risk of a portfolio (Jones Lang Wootton (JLW), 1986; Barber, 1991; Brown, 1988; 1991), and that there can be a considerable amount of unsystematic risk that is not diversified away. Miller and Scholes (1972) and Klemkosky and Martin (1975) studying the equity market showed that systematic (Beta risk) and unsystematic risks are positively related. This suggests in turn that a greater number of assets are needed to reduce a high Beta risk portfolio down to the same level of volatility as a low Beta risk portfolio. In addition it could be argued that most fund managers are not interested simply in the absolute variance of their portfolio returns but in the variance of the portfolio returns relative to a market portfolio, the tracking error variance (Roll, 1992). The results from Miller and Scholes (1972) and Klemkosky and Martin (1975) would suggest that portfolios with a high market risk (Beta) will also have a higher tracking error variance when compared with a low market risk portfolio of equal size. Despite the importance of these issues for property portfolio construction neither has been investigated. The object of this paper is to do this by examining in particular the extent to which the existence of high and/or low Beta assets in a portfolio affects tracking error by using a very large sample of property returns over the period from 1981 to 1996.

2.0 Portfolio diversification

In this paper, the effect of increasing the number of assets on a property portfolio's risk is discussed in the context of the Single Index Model (SIM), (Sharpe, 1966). Extending an idea first suggested by Markowitz (1959), Sharpe shows that the return of an asset (i) can be expressed by the following equation linking its returns to the returns of a market index (m):(see equation 1)where: R[sub]i is the return of the asset i; R[sub]m is the return on the market portfolio; [beta][sub]i is the index of the systematic risk of asset i; a[sub]i is the intercept coefficient and e[sub]i is a random error term, which has an expected value of zero.

The total risk (variance) of an individual investment or portfolio is thus

in two parts. The risk which is associated with market influences is called systematic risk and that which is unique or specific to the investment itself, is called unsystematic risk.

The variance of the investment can be given by the following equation:(see equation 2)Similarly the variance of a portfolio is given by:(see equation 3)In terms of property, unsystematic risk is associated with an individual property's characteristics such as location; regional and local economic conditions affecting demand and the comparative supply of similar properties; physical design and construction; tenant's credit worthiness; lease structure etc. These factors, and more, contribute to the performance of the asset and to its volatility. Such risk factors are perceived as being different from property to property. In principle careful or clever investors can construct portfolios which by virtue of diversification tend to cancel out the unsystematic risk element. By spreading the investments of the fund across locations and property types, a fund manager hopes that the unsystematic risk will largely disappear as an influence on the return of a well diversified property portfolio.

In contrast systematic risks are the external factors that are not specifically related to a property, but affect all investments in the market. Factors such as national economic policy; budgetary and other financial uncertainties; inflationary pressure; business and property cycles and demographics influence the market's overall risk and return profile.

This well-known division of the variability of returns into these two components has particular relevance to portfolio construction. The market related (systematic) risk of a portfolio is the weighted average of the market risks of the individual assets. The non-market (unsystematic) risk of a portfolio is also a function of the non-market risk of the individual assets, but the form is more complex. This is because, while every individual investment is influenced by various specific factors unique to that asset, in a portfolio such factors tend to be self-cancelling. It is through this process that naive diversification works. In constructing a naive, or equal-weighted, portfolio of increasing size it is the unique, or specific, components of risk that are reduced, not the market related or systematic risks. With sufficient diversification the total risk of a portfolio can be reduced, but naive diversification can never reduce risk (variance) to zero.

For example, assume that the portfolio is made up of equal investments in each asset and Var(e) is the average non-market risk of each investment. Then w[sub]i = 1/n and equation (3) can be rewritten as:(see equation 4)where(see equation 5)As n (the number of assets in a portfolio) increases, 1/n tends to zero and the amount of unsystematic risk tends to zero. In contrast the systematic risk tends to a limit [beta][sup]2[sub]p Var(R[sub]m) which is the market's risk level when the number of properties in the portfolio equals the number in the market. As n increases, the risk of the portfolio tends towards the risk of the market index.
Miller and Scholes (1972) and Klemkosky and Martin (1975) show that the systematic risk of an investment, measured by Beta, is positively related to the level of unsystematic risk. High Beta risk assets will therefore display high levels of unsystematic risk and so the number of assets needed to bring a high Beta risk portfolio down to the same level of volatility as a low Beta risk portfolio will be greater. Indeed it could be that a high risk portfolio may never achieve the same degree of risk reduction!

3.0 Data

The data used to study these effects in the UK market are derived from the Local Markets Report (IPD, 1998). The data in the Local Markets Report are in turn drawn from a database which at the end of 1998 contained 13,933 properties with an aggregate value of Pounds 75.3bn. The sample data consist of the total returns for properties in three sectors, retail,

office and industrial at various locations in the UK for each year from 1981 to 1996, to give a total of 392 asset possibilities. The locations are based for the most part on local authority boundaries defined in the 1992 Local Government Act. In terms of coverage the Retail data represent over 95 per cent of all Standard shops covered by the IPD data base. The comparable figures for Offices and Industrial are 72 per cent and 70 per cent respectively. The Local Markets Report data consequently represent an almost complete coverage of commercial property performance in the UK.

The data value for each location and each year represents an averaged aggregation of at least four individual properties. This is because data are not published for locations containing fewer than four properties in any year, in order to protect confidentiality. For simplicity in this paper the datum from each location is referred to as an "asset". As a result asset descriptions might be, for example, "Manchester Offices" or "Birmingham Retail" or "Sunderland Industrial".

4.0 The relationship between the Beta and residual risk

The association between the Beta and residual risk for the individual data was examined by regressing the estimated Beta for each location against its corresponding residual risk based on the 16 year's data. The Beta for each asset was computed using a first-pass regression of the time series of annual returns for each asset on the corresponding annual return of an equal-weighted "market" portfolio of all 392 assets. The residual risk, Var(e[sub]i), for each location was then calculated by subtracting the systematic risk of each asset from its own variance Var(R[sub]i). This follows the approach of Klemkosky and Martin (1975) who, citing the work of King (1966) and Myers (1973), present evidence of the impact of industry effects on security returns which would violate the assumption that covariance between all assets is zero and so could seriously bias the use of the zero covariance model assumed in equation (4). In a similar vein Lee (1998) documents a significant sector effect in property returns.

Table I shows the largest proportion of low risk property (Beta less than one) is in the Retail sector. In contrast the high Beta assets (Beta greater than one) are Offices and Industrial assets. The high Beta portfolio is consequently dominated by Office assets which have a significantly higher average value than in the low Beta portfolio.

Table II shows that the average value of property in the highest risk portfolio (the top 130 assets ranked by Beta) is twice that of the low Beta assets. Indeed the high Beta assets have, on average, significantly greater values than the lowest risk portfolio (the bottom 130 assets). The middle 130 assets share characteristics from both the high and low extremes of Beta.

In Table III descriptive statistics are presented for the data overall and again broken down into high, medium and low Beta groups each consisting of 130 "assets". Table III shows that, on average, the high Beta "asset" group has returns with correspondingly higher levels of risk, measured as either total or residual variance (Rvar), than both the medium and low Beta groups.

The association between the two measures of risk was then tested by a second-pass regression on a cross-sectional basis.

In Table IV, the overall regression of the Beta coefficients on the corresponding residual variance for each asset displays a significant positive relationship at less than the 1 per cent level. However, the overall coefficient of determination (Rsq.) is only 13 per cent. This implies that the relationship is weak and may differ across the range of the data. Indeed the results are only significant for the high Beta group. The medium and low risk groups show little or no relationship between Beta and residual variation[1].

5.0 The impact of market risk on portfolio diversification

The positive relationship between the individual Betas and the residual risk of each asset suggests that a similar relationship may exist between a portfolio's Beta and the amount of residual variance in a portfolio and hence the extent of the diversification that can be achieved. In order to test this, portfolios were simulated, by sampling with replacement, from each of the high and low Beta groups. (It may thought to be more realistic if the simulations are conducted on a without replacement basis rather than with replacement. Byrne and Lee (1999), however, using the same data set, find no significant difference in the results of simulation of equal and value-weighted portfolios conducted with or without replacement. Consequently the analysis here is based on a replacement strategy, with the not unreasonable implication that a second or third random selection of say "Manchester Office" simply means that this asset type may be well represented in a particular portfolio).

The simulation was made by initially selecting one asset at random from the data set and calculating its volatility (variance). A second asset was then randomly selected, added to the first and the volatility of the equal-weighted naive portfolio derived. The process continued until a 50-asset portfolio was achieved. The choice of this cut-off portfolio size was determined by the fact that, given each property location in the Local Markets Report data contains a minimum of four properties, a portfolio of 50 locations across the UK must actually contain at least 200 properties. Indeed the number of properties in each location can be considerably larger than four and a portfolio of 50 locations could contain well over a thousand individual properties (see Table VIII and Appendix). These are effective portfolio sizes far in excess of the average for funds in the UK of just over 50 properties (IPD, 1996). Increasing the simulated portfolio size beyond 50 would serve little purpose in the practical sense.

It also seems reasonable to assume that most, if not all, fund managers hold sector and regional weights similar to some benchmark portfolio, and that they follow some kind of value-weighted, rather than equal-weighted, diversification strategy. Morrell (1993) and Schuck and Brown (1997) both suggest that value-weighted portfolios need a larger number of properties to reach a satisfactory risk level compared with an equal-weighted portfolio, but that value-weighted portfolios should display a higher variability around the average risk reduction profile, as n increases, especially for portfolios of a small size. The simulations of Byrne and Lee (1999) show that this is the case, with value-weighted portfolios displaying a significantly higher mean portfolio risk than the mean risk of simulated portfolios using equal-weighting. A second set of simulations was undertaken based on a value-weighted scheme that used the individual annual capital values of each asset. An asset was chosen at random and its value noted. A second asset was then randomly chosen, again noting its value. The two-asset portfolio's value was then calculated and the percentage allocation of the portfolio between the two properties was estimated using the ratio of the individual asset values to that of the overall portfolio, on a period by period basis. The portfolio weights were then used in the calculation of the portfolio's return and risk. This process was continued as more assets were selected, until, as before, a 50 asset portfolio was reached.

It is of course necessary to sample a sufficient number of times to obtain statistically acceptable output distributions and statistics. Initially a sample size of 500 was used, but smaller sample sizes were tested, and finally a sample size of 100 was felt to be acceptable, since the reduced sample did not show any significant effect on the output statistics, implying quite stable portfolio structures from the data. Each experiment for both the equal and value-weighted cases was thus repeated 100 times for portfolios in steps of 1 up to 50 assets.

6.0 The extent of risk reduction

The impact of increasing portfolio size on variability is reflected in the level of residual variation (Rvar) remaining in the portfolio. The results in Table IV indicate, not unexpectedly, that high Beta portfolios are likely to have high levels of residual variation while low Beta portfolios are likely to have low levels of residual variation. Correspondingly portfolios with a high Beta are likely to require more assets than those with a low Beta to achieve the same level of risk reduction. A comparison of the mean Rvars of the equal and value-weighted, high and low Beta portfolios generated by the simulations is presented in Table V.

Table V shows that the ratio of high Beta mean residual variation to low Beta residual variation is greater than one and tends to increase as the portfolio size increases. This is true for equal and value-weighted portfolios. High Beta portfolios contain greater amounts of residual variation than low Beta portfolios. The difference in performance between equal and value-weighted portfolios is apparent in the ratios of high to low Beta portfolios, with the value-weighted portfolio ratio reflecting the weighting effects of the values of assets at both ends of the distribution, i.e. single, large value, high Beta assets and low value, low Beta assets.

A comparison of the absolute levels of residual variation in Table V shows that a larger number of assets is needed for high Beta portfolios to achieve the same level of risk reduction as low Beta portfolios. For example, a high Beta equal-weighted portfolio requires nine assets to achieve the same level of reduction in residual variation as a low Beta portfolio of three assets. Similarly a low Beta portfolio of five assets has the same level of residual variation as a high Beta portfolio of 25 assets. The residual variation in a low Beta portfolio of seven assets cannot be matched by a high Beta portfolio containing 50 assets. Substantially more assets are needed therefore to achieve the same level of portfolio residual risk for a high Beta portfolio risk reduction strategy. These results are comparable with those of Miller and Scholes (1972) and Klemkosky and Martin (1975) for the equity market.

7.0 Assessing portfolio performance against market benchmarks

Fund managers are not only concerned with the overall risk of their portfolios. They are equally, or perhaps more, interested in the risk of their returns relative to some benchmark of performance (Roll, 1992). Fund managers often try to add value to their fund relative to the benchmark by achieving returns in excess of the benchmark but at the cost of incurring active risk relative to that benchmark. Such active risk is referred to as tracking error since it quantifies the extent to which the portfolio can be expected to obtain a return different to that of the benchmark. Fund managers should be conscious, therefore, of tracking error and its variance. Grinhold (1993) amongst others, shows that the tracking error variance (TEV) of an investment or portfolio relative to some benchmark of performance is given by the following equation:(see equation 6)This expression for the tracking error variance clearly illustrates the two main sources of potential active management risk in a portfolio. First, TEV will increase as the portfolio Beta deviates from that of the benchmark portfolio (which, by definition, has a Beta value of one). Second, TEV increases as the residual risk of the portfolio increases.

This active return or tracking error risk is also directly related to the business risk faced by fund managers. Portfolios with high tracking errors have a greater probability of out- or under-performing the benchmark portfolio.Fund managers who depart significantly (perhaps through active management) from the benchmark portfolio in search of higher returns do so at the risk of investor dissatisfaction. Thus fund managers with a strong instinct for self-preservation will be driven towards a lower tracking error, which is presumably safer in job terms. This leads fund managers to aim typically for a Beta very similar to the market i.e. one, and to

increase the number of assets in a portfolio, such that the percentage level of residual variance in a portfolio reaches some acceptable level.

All this assumes that there is no relationship between a portfolio's Beta and its residual variation. Equation 5 shows that for two portfolios with the same level of residual variance (Var(e[sub]i)) the portfolio with the least difference between its Beta and that of the market will have a lower TEV, irrespective of whether the portfolio's Beta is greater than or less than one. Similarly for two portfolios with Betas that show the same difference from the market benchmark, the portfolio with the lower residual variance will have the lower TEV. Here however, the results for the individual assets and for the portfolio simulations indicate a positive relationship between Beta and residual variation (Rvar). Consequently a portfolio with a high Beta requires more assets than one with a low Beta to achieve the same level of reduction in residual variation and so a lower TEV. Given two property portfolios with the same number of assets the portfolio with a Beta less than one will have a lower residual risk and hence a lower TEV.

The results in Table VI confirm this. The low Beta portfolios display lower mean TEV than the high Beta portfolios, both equal and value-weighted. For fund managers interested in reducing tracking error risk to a low level (which Brown (1988) suggests might be of the order of 5 per cent), a low Beta portfolio seems preferable to a high Beta portfolio. Table VI also shows that in order to achieve low levels of TEV a fund will have to hold a large number of assets. For example even at the 50 asset portfolio level the tracking error variance is still 14.2, a standard deviation of 3.8. This implies that in two years out of three such a portfolio will, on average, under or over-perform the benchmark by almost 3.8 per cent. It will also be noticed that the value-weighted ratio is larger that that for equal-weighting, as it is for residual variation.
At first sight this would seem to suggest that fund managers should follow a policy of investing in low Beta assets because such a portfolio will have a low tracking error. This is not really the case for three reasons. First, as shown in Table III, high Beta assets have higher returns on average than low Beta assets by over 70 basis points. A fund manager who holds a low Beta portfolio consequently has less chance of out-performing the market. Secondly, holding a low or high Beta portfolio suggests that fund managers are effectively attempting to follow some kind of market timing strategy. Studies show however that fund managers actually have poor market timing skill, and many show perverse timing ability (Lee, 1997). In addition, if the fund managers fall into such a "Beta-rut", they may pay a severe price in terms of performance and job security when the market turns against them. Consequently, a middle way is less damaging to their overall "wealth". Finally, Blume (1975) shows that there is, over time, a regression to the mean in Betas, that is high Beta assets will tend to converge downwards towards the average Beta while low Beta assets will tend to display higher Beta levels. This instability in Beta suggests that in order to maintain a portfolio at a given Beta the fund manager needs to have in the portfolio a mix of high and low Beta assets rather than aiming to hold all high or all low assets. Fund managers will need to find a combination of high Beta assets which offer higher returns and low Beta assets to obtain a lower tracking error to maintain the desired Beta for the portfolio overall. Is it possible to do this and still achieve an acceptable reduction in portfolio risk?

In order to test this further simulations were run, this time on the set of 130 "assets" consisting of the top 65 high Beta and bottom 65 low Beta assets. The results are shown in Table VII.

As can be readily appreciated the high/low Beta strategy offers reductions in residual variance and a TEV that will generally out-perform the high and low Beta strategies. This is emphasised when the simulated portfolio's assets are partially dis-aggregated to show the average number of properties and the average value in all three portfolio strategies at each

portfolio size (Table VIII). The high/low strategy achieves this reduction in residual and tracking error variances using fewer properties, at considerably lower cost. Thus, a policy that aims to track the market is more easily achieved by having a portfolio Beta close to the market (= 1) so that the first term of equation (5) tends to zero and the TEV is minimised. However, as shown in Table VIII, the portfolio size needed to achieve this is prohibitively large in terms of both capital value and number of properties.

The most striking feature of Table VIII is the extremely large number of properties needed to get residual and tracking error variance down to low levels. In the case of the high and low Beta strategies this is in excess of 1,300 properties. Even for the high/low Beta strategy the number is still on average over a thousand. The average cost of such portfolios is even more astonishing with average portfolio values of around Pounds 5bn for the high and low Beta strategies and over Pounds 2.6bn for the high/low strategy. These portfolio sizes and values are far in excess of those of the typical UK property fund. Thus it is extremely unlikely that the vast majority of property funds in the UK can track the "market" benchmark.

8.0 Conclusions

This study has investigated the relationship between Beta (market) risk on the residual variation in individual assets using data for 392 "assets" across the UK. It confirms earlier work on the general effects of diversification, in real estate in particular. It also provides additional insights into the effect that systematic risk has on the numbers and characteristics of properties that need to be held to reach acceptable tracking error levels for the portfolio.

The regression results reported in Table IV show a significant and positive relationship between individual assets and residual variation, supporting the results of Miller and Scholes (1972) and Klemkosky and Martin (1975) in the equity market. The practical implications of this are that high Beta risk portfolios are likely to require more assets than low Beta risk portfolios to achieve the same level of risk reduction. The simulation results in Table V confirm this. Indeed in some cases the high Beta portfolio can never achieve a reduction in residual risk to below that of the low Beta portfolio. The results at first sight imply that fund managers should concentrate their holdings in low Beta assets.

Tables VII and VIII show that a mixed high/low Beta strategy would seem to offer the best of both worlds, that is low tracking error at a significantly reduced cost in terms of the number of properties to hold and the value of such a portfolio. However these results suggest that very few, if any, UK property funds can achieve a low level of tracking error, even based on a mixed high/low Beta strategy.

In the case of typical UK property funds it is likely that their performance will be determined by the level of unsystematic risk (residual variance) in their portfolios, that is by stock selection, rather than any policy considerations as to sector allocations i.e. the portfolio Beta. The results in Table V show that small portfolios, even low Beta portfolios have, on average, extremely high levels of residual variation. Even the performance of the largest funds is likely to be driven as much by stock selection as sector policy because even these funds still display large residual variances, although policy decisions on sector/regional allocation and hence portfolio Beta will become as important as the fund size increases. In addition the simulation results in Tables VI, VII and VIII show that it is likely to be very difficult for the largest funds to track the market with any confidence since even for funds of Pounds 5bn and above the TEV is still high. Consequently fund managers, even the managers of the largest funds, cannot follow a passive investment portfolio strategy and need to monitor the characteristics of their individual property holdings constantly in order to correct for any deviation from the preferred or

desired Beta risk of the portfolio as a consequence of changes in the Betas of the individual assets.

The number of properties needed and the cost is far in excess of the current average property portfolio size in the UK. The practical implication of this is that UK property fund performance is likely to be mainly driven by stock selection. Even for the largest funds who wish to track the market the costs in terms of portfolio value seem prohibitively expensive. No UK property fund, even the largest, can follow a passive investment policy.
Note

1. The significance of the relationship between the Beta coefficients and the residual risk was also tested using the Spearman rank correlation method to avoid any potential bias due to extreme values in the data. The computed rank correlation coefficient confirms the results in Table IV.

References

1. Barber, C. (1991), "Modern portfolio theory; fact and fantasy", a paper presented as part of the seminar series organised by the Society of Property Researchers and the RICS, entitled Property in a Portfolio Context.

2. Blume, M.E. (1975), "Betas and their regression tendencies", Journal of Finance, Vol. 30 No. 3, pp.785-95.

3. Brown, G.R. (1988), "Reducing the dispersion of returns in UK real estate portfolios", Journal of Valuation, Vol. 6 No. 2, pp. 127-47.

4. Brown, G.R. (1991), Property Investment and the Capital Markets, E & F.N. Spon, London.

5. Byrne, P.J. and Lee, S.L. (1999), "Portfolio size and the reduction of dispersion: the case of the United Kingdom commercial real estate market", a paper presented at the American Real Estate and Urban Economics Association and Asian Real Estate Society International Conference, Maui, Hawaii, May.

6. Grinhold, R.C. (1993), "Is beta dead again?", Financial Analysts Journal, July-August, pp. 28-34.

7. IPD (1996), IPD Property Investor's Digest 1996, Investment Property Databank, London.

8. IPD (1998), Local Markets Report, Investment Property Databank, London.

9. Jones Lang Wootton (1986), Risk and Asset Allocation: Implications of Portfolio Strategy.

10. King, B.F. (1966), "Market and industry factors in stock price behavior", Journal of Business, Vol.39 No. 1, pp. 139-70.

11. Klemkosky, R.C. and Martin, J. (1975), "The effect of market risk on portfolio diversification", Journal of Finance, Vol. 30, March, pp. 147-54.

12. Lee, S.L. (1997), "The components of property fund performance", The Journal of Real Estate Portfolio Management, Vol. 3 No. 2, pp. 97-106.

13. Lee, S.L. (1998), "Sector and regional factors in real estate returns", a paper presented at the Fourteenth Annual American Real Estate Society Meeting, Monterey, CA, April.

14. Markowitz, H. (1959), Portfolio Selection: Efficient Diversification of Investments, Wiley, New York, NY.

15. Miller, M.H. and Scholes, M. (1972), "Rates of return in relation to

risk: a re-examination of some recent findings", in Jensen, M.C. (Ed.), Studies in the Theory of Capital Markets, Praeger, New York, NY, pp. 60-62.

16. Morrell, G.D. (1993), "Value-weighting and the variability of real estate returns: implications for portfolio construction and performance evaluation", Journal of Property Research, Vol. 10 No. 3, pp. 167-83.

17. Myers, S.L. (1973), "A re-examination of market and industry factors in stock price behavior", Journal of Finance, Vol. 28 No. 3, pp. 695-705.

18. Roll, R. (1992), "A mean/variance analysis of tracking error", Journal of Portfolio Management, Summer, pp. 13-22.

19. Schuck, E.J. and Brown, G.R. (1997), "Value weighting and real estate risk", Journal of Property Research, Vol. 14 No. 3, pp. 169-88.

20. Sharpe, W.F. (1966), "A simplified model for portfolio analysis", Management Science, Vol. 9 No.2, pp. 277-93.

Appendix

seeTable AI

Caption: Table I.; Proportion of high and low Beta assets by sector; Table II.; Typical values of property in high, medium and low Beta portfolios; Table III.; Descriptive statistics; Table IV.; Results of the cross-sectional regression of Beta against Rvar; Table V.; Average residual variation of high and low Beta portfolios - equal and value-weighted; Table VI.; Average tracking errors of high and low Beta portfolios - equal and value-weighted; Table VII.; Residual and tracking error variance mixed high and low Beta portfolios - equal and value-weighted; Table VIII.; The average number of properties and average capital value in the simulated high, low and high/low Beta value-weighted portfolios; Table AI.; Percentage composition of the simulated portfolios; (see equation 1); (see equation 2); (see equation 3); (see equation 4); (see equation 5); (see equation 6)

GEOGRAPHIC NAMES: United Kingdom; UK

DESCRIPTORS: Studies; Property; Risk management; Portfolio management
CLASSIFICATION CODES: 9130 (CN=Experimental/Theoretical); 8360 (CN=Real estate); 3400 (CN=Investment analysis & personal finance); 9175 (CN=Western Europe)
PRINT MEDIA ID: 46125

...TEXT: pass regression on a cross-sectional basis.

In Table IV, the overall regression of the Beta coefficients on the corresponding residual variance for each asset displays a significant positive relationship at less... value-weighted portfolios. High Beta portfolios contain greater amounts of residual variation than low Beta portfolios . The difference in performance between equal and value-weighted portfolios is apparent in the ratios of high to low Beta portfolios, with the value-weighted...
... and Scholes (1972) and Klemkosky and Martin (1975) for the equity market.

7.0 Assessing portfolio performance against market benchmarks

Fund managers are not only concerned with the overall risk of their portfolios. They are equally, or perhaps more, interested in the risk of their returns relative to some benchmark of performance (Roll, 1992). Fund managers often try to add value to their fund relative to the benchmark by achieving returns in excess of the benchmark but at the

cost of incurring active risk relative to that benchmark. Such active risk ...

...since it quantifies the extent to which the portfolio can be expected to obtain a return different to that of the benchmark . Fund managers should be conscious, therefore, of tracking error and its variance. Grinhold (1993) amongst others, shows that the tracking error variance (TEV) of an investment or portfolio relative to some benchmark of performance is given by the following equation:(see equation 6)This expression for the tracking error...performing the benchmark portfolio.Fund managers who depart significantly (perhaps through active management) from the benchmark portfolio in search of higher returns do so at the risk of investor dissatisfaction. Thus fund managers with a strong instinct... can follow a passive investment policy.

Note

1. The significance of the relationship between the Beta coefficients and the residual risk was also tested using the Spearman rank correlation method to avoid...

...30, March, pp. 147-54.

12. Lee, S.L. (1997), "The components of property fund performance ", The Journal of Real Estate Portfolio Management, Vol. 3 No. 2, pp. 97-106.

13. Lee, S.L. (1998), "Sector and...Morrell, G.D. (1993), "Value-weighting and the variability of real estate returns: implications for portfolio construction and performance evaluation", Journal of Property Research, Vol. 10 No. 3, pp. 167-83.

17. Myers, S...

000101

7/9,K/2 (Item 2 from file: 15)

00617533 92-32635

Risk-Adjusted Performance Attribution

Ankrim, Ernest M.

Financial Analysts Journal v48n2 PP: 75-82, 74 Mar/Apr 1992 CODEN: FIAJA4 ISSN: 0015-198X JRNL CODE: FIA
DOC TYPE: Journal article LANGUAGE: English LENGTH: 9 Pages
SPECIAL FEATURE: Charts Graphs Appendix Equations References
WORD COUNT: 3029

ABSTRACT: A portfolio manager's returns are generally compared with the returns of some benchmark. The difference between the portfolio's return and the benchmark return is called the manager's excess return. Portfolio performance attribution systems separate this excess return into 3 categories: an allocation effect, a selection effect, and a cross-product effect. The objective of risk-adjusted performance attribution is to remove any excess returns that would have been expected, given the manager's risk exposure. This entails a 3-step process: 1. Estimate the average betas for both the manager and the benchmark. 2. Using these estimated betas and a measure of the returns to the market, calculate an expected excess return for the portfolio. 3. Subtract this expected excess return due to risk from the realized excess returns of the manager for the period under analysis.

TEXT: Portfolio performance attribulion systems generally start with a portfolio's return in excess of some benchmark return. They then identify the fractions of excess returns that can be traced to allocation decisions,

to selection decisions, and to a residual crossproduct, or interaction, effect. This article illustrates how a simple risk-adjustment procedure can be incorporated into these attribution measures. Research so far suggests that for as many as one-third of certain "style" managers, this risk adjustment could be as large as 160 to 240 basis points a year.

We compare the current method of attribution assignment (which doesn't consider risk) with a proposed method of distributing the expected rewards to risk-taking across the specific attributes. In general, current methods will end to over-reward risky managers and under-reward more conservative ones.

PERFORMANCE ATTRIBUTION

Portfolio performance measurement techniques have a short history. In the mid to late 1960s, several researchers sought to summarize more accurately the overall performance of a manager or to provide some measure of risk-related performance.(1) Building on the foundation of the Capital Asset Pricing Model (CAPM) and this earlier work, Fama suggested decomposing the sources of a manager's returns into "selectivity" and "risk."(2) Fama further separated out of returns to risk returns to timing. In the mid-1980s, Brinson and Fachler and Brinson, Hood and Beebower illustrated accounting decompositions that could be applied at the plan level (across managers) or at the individual manager level.(3)

Under this last approach, whether the manager's extra returns were decomposed into "market selection, stock selection and cross products" or "policy, selection and interaction," the result was three attributes that summed to the excess returns of the portfolio relative to an appropriate benchmark. This separation allowed sponsors to view the sources of their managers' returns in addition to observing their overall performances. Unfortunately something was lost as we progressed from Fama to today's application of accounting decomposition.

In Fama's work, all the return figures were identified on the basis of a given level of risk in the ortfolio. To identify a managers selectivity returns, it was necessary to identify the rate of return on a benchmark portfolio with the same level of risk. Fama measured risk as the CAPM beta--or the portfolio's systematic (market-related) risk. A manager's selectivity returns were the realized returns minus the returns to a market portfolio with an equal beta.

Fama also defined timing in relation to beta. Fama described a timing decision as the manager's choice of "a portfolio with a level of (beta) risk higher" than average, reflecting the manager's feeling that "risky portfolios in general would do abnormally well... during the period under consideration."(4)

In the more recent approaches to performance attribution, the element of risk is assumed to be captured by the appropriately selected benchmark. Consider Grieger's description of the "analysis of management effect" (AME).(5) It illustrates the calculation of three performance attributes--allocation effect, selection effect and interaction effect.

* Allocation effect (AE) measures "the value of the manager's decision to allocate assets differently than the benchmark. To calculate this effect, we take the difference between the sector weighting in the portfolio and the weighting in the benchmark and multiply this difference by that sector's return for the benchmark."(6)

* Selection effect (SE) measures "the impact of the manager's decisions to select securities which may (or may not) outperform those of the benchmark. To calculate this effect we take the difference between the manager's sector return and that of the benchmark. This return differential is then multiplied by the benchmark sector weight."(7)

* Interaction effect (IE) measures the impact of the allocation decision when the performance of the selected securities in the portfolio differs from that of the benchmark. "This measurement is calculated by taking the difference between the sector returns of the portfolio and benchmark, and multiplying them by the weighting difference in that sector between the portfolio and bencmark."

The appeals of recent attribution approaches lie in the ease of interpretation, the straightforward calculations, and their intuitive nature. But these approaches rely on the selection of the correct benchmark to deal with variations in risk. This will be sufficient only to the extent that a perfectly matched (equal-risk) benchmark can be identified.

Some research indicates that the distribution of manager betas, even within narrowly defined style groups, can be significantly dispersed around the benchmark average.(8) This implies that at least some of the differences in policy (allocation), selection and interaction returns between managers could be explained by differences in the riskiness of their portfolios.

RISK EFFECTS

Beyond the association between higher expected returns and higher risk, why should risk exposure be expected to influence performance attribution measures? Consider how risk affects both the manager's overall performance (the combined effects of the attributes) and each attribute separately.

The sum of the three attribution effects equals the excess return the manager generates relative to the appropriate benchmark. This measurement, therefore, implies that the source of all returns in excess of the benchmark must be timing, selection and interaction effects. However, managers that consistently adopt risks higher than the benchmark risk will, on average, be expected to generate returns higher than the benchmark return. Conventional attribution measures lump these excess returns due to risk along with other unexplained excess returns and assign the total to the three attribution effects. At the same time, managers who consistently construct lower-risk portfolios will be expected to generate, on average, lower returns to risk than the benchmark. But attribution measures treat these lower returns as if the managers had made poor timing, selection or interaction decisions.

The individual attributes are also distorted when the manager's assumed risk differs from the benchmark's risk. Consider, for example, a manager who allocates funds across industrial sectors. if he places proportionately more funds in high-risk sectors than the benchmark does, the proportion of his performance attributed to asset allocation will be exaggerated. Similarly, a manager will display higher-than-average selection effects if he places a larger fraction of portfolio funds in high-risk securities than the benchmark does. And interaction effects will be exaggerated by placing proportionately more of the fund in those sectors where the portfolio contains riskier stocks than the benchmark does.

RISK-ADJUSTED PERFORMANCE ATTRIBUTION

There is nothing new in expecting higher returns from the assumption of higher risk. But how can some simple measure of risk (like portfolio beta) be incorporated into performance attribution measures? The objective of risk-adjusted performance attribution (RAPA) is to remove any excess returns that would have been expected, given the manager's risk exposure. This entails a three-step process:

* Estimate the average betas for both the manager and the benchmark (specific style benchmarks may exhibit betas different from 1.0(9)
* Using these estimated betas and a measure of the returns to the market (broad market return minus the risk-free rate), calculate an expected excess return for the portfolio. For managers whose average beta is close

to the beta of the benchmark, the expected excess return will be close to zero.

* Subtract this expected excess return due to risk from the realized excess returns of the manager for the period under analysis.

In essence, this process is nothing more than the calculation of a Jensen-type risk-adjusted return (alpha). The calculations for the individual attributes differ in form, but the intent is the same--to restate excess returns in terms that control for risk. Brief descriptions of these calculations are given below. These assume the manager invests in equities only, and that the securities can be categorized into economic sectors. (The appendix provides the derivations of the proposed adjustments.)

ALLOCATION ADJUSTMENT

To adjust the allocation effect for risk, first calculate the average fraction of the benchmark portfolio contained in each sector over time. Table I provides an example in which the sectors are technology, producer durables, consumer discretionary, utilities and all other. These fractions (or weights) are then subtracted from the corresponding manager's long-term average weights.(10) Table I displays these weights under the heading "Differences." In this example, the manager has 15% more of his portfolio in technology issues than the benchmark does.

Second, multiply these weighting differences by the benchmark's beta for each corresponding sector. These products indicate whether the manager has systematically allocated the portfolio toward higher-risk sectors. Then multiply each product by the current return to market risk (the broad market return minus the risk-free rate). This yields the expected excess allocation return due to risk. The sum of these products is identified in Table I as the allocation entry under "Risk Adjustment." In this example, we would have expected the manager's portfolio to exhibit an allocation effect due to risk of 22.2 basis points.

This expected excess allocation amount is subtracted from the realized allocation effect to yield the risk-adjusted allocation effect. Note that, in this example, the risk-adjusted allocation effect is negative. The allocation effect is less than we would have expected, given the current return in the market and the risk stance of the manager.

SELECTION ADJUSTMENT

To calculate the selection adjustment, first calculate the long-term average benchmark weights for each sector (the fraction of the benchmark portfolio value contained in each sector).

For each sector, calculate a longterm average beta for both the manager and the benchmark. Rather than performing the typical regression on portfolio or sector returns over time, we suggest you calculate individual security betas for some standard period (say 60 months) and weight these security betas by the proportion of the sector that each security represents. For the benchmark, the makeup of the sector portfolios is not likely to change much from one period to the next; the benchmark sector betas will therefore exhibit only the variation typical of security betas over time. The manager's portfolio, however, will also show beta variation deriving from changes in the selection of and weight given to different securities.(11)

Once sector betas have been calculated for both the benchmark and the manager's portfolio, subtract each of the benchmark's sector betas from the manager's. Table I lists these differences in the "Beta" column under "Differences." Multiplying these differences by their corresponding benchmark sector weights and summing over all sectors produces a value that indicates (by its sign) whether the manager has selected riskier stocks, on average, than the benchmark. Multiplying this value by the current return

to market risk (total market index return minus the riskfree rate) yields the expected excess selection returns due to risk. In Table I, this is listed under "Risk Adjustment" on the "Selection" line. In this case, we would have expected the manager to generate 47.3 basis points of selection returns, based solely on the risk of the stocks he selected.

Subtracting this expected excess selection amount from the realized selection effect yields the risk-adjusted selection effect. Our example shows that, even after the adjustment, the manager generated positive (but substantially smaller) selection returns.

INTERACTION ADJUSTMENT

To calculate the interaction adjustment, first find the differences between the manager's and the benchmark's sector weights (as in the first step of the allocation adjustment).

For each sector, take the difference between the manager's and the benchmark's beta (as in the third step of the selection adjustment). Multiply these differences by the sector weight differences.
Use of long-term averages in these calculations will indicate whether the manager should be rewarded for placing larger-than-normal bets in those sectors where he has selected riskier-than-normal securities. Capturing this effect requires calculating the covariance of the sector weight differences with the beta differences. This covariance should be added to the products of the differences.

Sum the products (plus the covariance, if using long-term averages) over all sectors. Multiplying this sum by the current return to market risk yields the expected excess interaction return due to risk. In Table I, the interaction return due to risk is listed under "Risk Adjustment." We would have expected 19.3 basis points of excess return to be generated by a manager with a risk profile like the one in our example.

Subtracting this expected excess interaction amount from the realized interaction effect yields the risk-adjusted interaction effect. In the example, the risk-adjusted interaction effect is 22.6 basis points, compared with the unadjusted interaction return of 41.9 basis points.

With all three adjustments, the overall excess return of 120.3 basis points is reduced by our risk-adjustment process to a RAPA value of 31.5 basis points.

CONCLUSION

Are these adjustments large? That question can be answered only on a manager-by-manager basis. A rough guess at the size of the adjustment can be made by considering the form of the sum of the total adjustment amount (TAA):(12) where Bm and Bb are the total portfolio betas for the manager and the benchmark.

Christopherson and Turner's study of 177 portfolio managers found that the regression betas of as many as a third of the managers within certain style groups exhibited portfolio betas that differed from their benchmarks by 0.2 to 0.3.(13) For this range of beta differentials, a premium of market returns over the risk-free rate of 8% (average for 1920-90) would yield adjustment amounts of 160 to 240 basis points a year. This suggests the proposed adjustments might be significant in more than isolated cases.

This might be particularly true for certain style classes. From the Christopherson and Turner data, I calcuated current beta values for the 24 small-cap managers for which there were more than four years of data. Figure A illustrates the distribution of the managers' portfolio betas in excess of a small-cap benchmark beta. Of the two dozen small-cap managers in this sample, only two had average portfolio betas that were less than the average benchmark beta. While the sample is not sufficiently large to

draw any strong conclusions about the magnitude of the proposed adjustments, it suggests the risk of the portfolios of at least some managers differ from the risk of their benchmarks.

Clearly, there are limitations on the use of beta as a proxy for risk. If we restrict our analysis to equities, then beta is a reasonable single-factor proxy. If we expand the analysis to mixed asset class portfolios, we need betas (or other compatible proxies) for other security classes (bonds, real estate, etc). While duration-driven risk adjustments are possible for fixed income components, estimation of other risk proxies requires a rate of return for the total market, a figure that is likely to be a source of disagreement. If we expand the analysis to global portfolios, we need to develop an acceptable index for a global riskfree rate.

For many managers, the proposed risk adjustments will be close to zero. These will be the managers whose average portfolio betas are very close to the betas of their benchmarks. For a significant minority, however, the adjustments will not be trivial. Recognizing and estimating an appropriate adjustment to account for the expected returns due to risk exposure should lead to a better indication of whether managers, over time, have truly added value by their portfolio decisions. That information should be of interest to clients as well as their advisers.

FOOTNOTES

1. See P.O. Dietz, Pension Funds: Measuring Investment Performance (New York: The Free Press, 1966); J.L. Treynor, "How to Rate Management of Investment Funds," Harvard Business Renew January-February 1965; W F. Sharpe, "Mutual Fund Performance," Journal of Business, January 1966; and M. Jensen, "The Performance of Mutual Funds in the Period 1945-64 "Journal of Finance May 1968.

2. E. F Fama, "Components of Investment Performance, "Journal of Finance, June 1972.

3. G. P. Brinson and N. Fachler, "Measuring Non-U.S. Equity Portfolio Performance," Journal of Portfolio Management. Spring 1985 and C. P. Brinson, L. R. Hood and G. L. Beebower "Determinants of Portfolio Performance," Financial Analysts Journal, July/August 1986.

4. Fama, "Components of Investment Performance," op. cit.

5. D. T. Grieger, "U.S. Equiry Analysis of Management Effect Description" (Frank Russell Company, Tacoma, April 1987).

6. Grieger continues, "less the total rate of return of the benchmark." But since this value never changes across sectors, its effect disappears when the sector allocation effects are summed. This element of the calculation is omitted for simplicity and consistency with other aproaches. Nothing in the results is changed if it is included.

7. Recent attribution approaches evidence a high degree of consistency in the definition of selection. Timing, however is interpreted differently by different studies. In the current tactical asset allocation (TAA) literature, timing refers to the gains associated with moving into equities and out of cash when the market is correctly anticipated to rise, and vice versa. This article considers timing in a more general sense, one that includes the TAA interpretation but in cases of equity-only attribution, also includes the movement from conservative into rise equities in anticipation of a general market rise (a la Fama). In a total portfolio attribution analysis, both types of timing returns would show up in the allocation effect; hence allocation and timing returns are used interchangeably.

8. See J. A. Christopherson and A. L. Turner "Volatility and Predictability of Manager Alpha," Journal of Portfolio Management, Fall 1991.

9. The betas I used were built up from the security level. The 60-month trailing beta for each security was weighted by its proportion of the manager's portfolio by sector. This calculation was also done for the benchmark portfolio. I thank Mary Beth Colon for her assistance in the preparation of this data set.

10. It may seem desirable, for ease of calculation, to consider only current weights. This simplification, however, will miss any ability of the manager to engage in Fama-type timing (i.e., moving into higher-risk sectors in anticipation of market rises.)

11. Once again, using only current values in this analysis will miss any ability of the manager to engage in security of timing (i.e., departing from standard security betas within a sector to take on riskier stocks within the sector). Considering only current portfolios, will not distinguish between a manager who takes risker positions in anticipation of market moves and a manager who consistently holds such a position. The value of recognizing this difference must be balanced against the substantial increase in data required to capture the effect.
12. See the appendix for a compete description of the variables.

13. Christopherson and Turner, "Manager Alpha Volatility," op. cit.

THIS IS THE FULL-TEXT.
GEOGRAPHIC NAMES: US

DESCRIPTORS: Securities analysis; Portfolio management; Risk assessment; Portfolio performance; Performance evaluation; Mathematical models
CLASSIFICATION CODES: 3400 (CN=Investment analysis); 9130 (CN=Experimental/Theoretical); 9190 (CN=United States)

ABSTRACT: A portfolio manager's returns are generally compared with the returns of some benchmark . The difference between the portfolio's return and the benchmark return is called the manager's excess return . Portfolio performance attribution systems separate this excess return into 3 categories: an allocation effect, a selection effect ...
TEXT: Portfolio performance attribulion systems generally start with a portfolio 's return in excess of some benchmark return . They then identify the fractions of excess returns that can be traced to allocation decisions, to selection decisions, and to a residual crossproduct...

... current methods will end to over-reward risky managers and under-reward more conservative ones.

PERFORMANCE ATTRIBUTION

Portfolio performance measurement techniques have a short history. In the mid to late 1960s, several researchers sought...

... or "policy, selection and interaction," the result was three attributes that summed to the excess returns of the portfolio relative to an appropriate benchmark . This separation allowed sponsors to view the sources of their managers' returns in addition to...

... ortfolio. To identify a managers selectivity returns, it was necessary to identify the rate of return on a benchmark portfolio with the same level of risk. Fama measured risk as the CAPM beta--or...
... take the difference between the sector weighting in the portfolio and the weighting in the benchmark and multiply this difference by that sector's return for the benchmark ."(6)

* Selection effect (SE) measures "the impact of the manager's decisions to select securities...

... the benchmark. To calculate this effect we take the difference between the manager's sector return and that of the benchmark . This return differential is then multiplied by the benchmark sector weight."(7)

* Interaction effect (IE) measures the impact of the allocation decision when the performance of the selected securities in the portfolio differs from that of the benchmark. "This measurement is calculated by taking the difference between the sector returns of the portfolio and benchmark , and multiplying them by the weighting difference in that sector between the portfolio and bencmark...

...attributes) and each attribute separately.

The sum of the three attribution effects equals the excess return the manager generates relative to the appropriate benchmark . This measurement, therefore, implies that the source of all returns in excess of the benchmark must be timing, selection and interaction effects. However, managers that consistently adopt risks higher than the benchmark risk will, on average, be expected to generate returns higher than the benchmark return . Conventional attribution measures lump these excess returns due to risk along with other unexplained excess returns and assign the total to the...

... managers who consistently construct lower-risk portfolios will be expected to generate, on average, lower returns to risk than the benchmark . But attribution measures treat these lower returns as if the managers had made poor timing, selection or interaction decisions.

The individual attributes...from the assumption of higher risk. But how can some simple measure of risk (like portfolio beta) be incorporated into performance attribution measures? The objective of risk-adjusted performance attribution (RAPA) is to remove any excess...

... for the portfolio. For managers whose average beta is close to the beta of the benchmark , the expected excess return will be close to zero.

* Subtract this expected excess return due to risk from the...
...indicates (by its sign) whether the manager has selected riskier stocks, on average, than the benchmark . Multiplying this value by the current return to market risk (total market index return minus the riskfree rate) yields the expected excess...of beta as a proxy for risk. If we restrict our analysis to equities, then beta is a reasonable single- factor proxy. If we expand the analysis to mixed asset class portfolios, we need betas (or...

...Finance, June 1972.

3. G. P. Brinson and N. Fachler, "Measuring Non-U.S. Equity Portfolio Performance ," Journal of Portfolio Management. Spring 1985 and C. P. Brinson, L. R. Hood and G. L. Beebower "Determinants of Portfolio Performance ," Financial Analysts Journal, July/August 1986.

4. Fama, "Components of Investment Performance," op. cit.

5...

...Description" (Frank Russell Company, Tacoma, April 1987).

6. Grieger continues, "less the total rate of return of the benchmark ." But since this value never changes across sectors, its effect disappears when the sector allocation...required to capture the effect.

12. See the appendix for a compete description of the variables .

13. Christopherson and Turner, "Manager Alpha Volatility," op. cit.

...DESCRIPTORS: Portfolio performance ;
920300

7/9,K/3 (Item 3 from file: 15)
DIALOG(R)File 15:ABI/Inform(R)

00123035 80-17040
Performance Evaluation and Benchmark Errors (I)
Roll, Richard
Journal of Portfolio Management v6n4 PP: 5-12 Summer 1980 ISSN: 0095-4918 JRNL CODE: JPO
DOC TYPE: Journal article LANGUAGE: English
SPECIAL FEATURE: Graphs Equations References

ABSTRACT: An analysis was conducted to determine the errors which exist in the estimate of risk in an unmanaged portfolio. The unmanaged portfolio is used as a benchmark in the evaluation of returns on a managed portfolio. One of the primary sources of error is the ex ante capital asset pricing model benchmark, which is not eliminated by repeated evaluations. This condition will occur whenever the market index is not an ''optimized'' portfolio, i.e., if the market index is not on the evaluator's ex ante mean/variance efficient frontier. Depending on specific circumstances, the error in the benchmark can bias the performance as either better or worse than actual performance. The situation of better than actual performance will generally exist when the portfolio's expected return is larger than the expected return of the market index, and vice versa. A methodology exists for detecting the existence of this type of error; it is based on estimating the beta factor and the slope of the portfolio locus. These factors are applied to an expected return/standard deviation of return grid, with the ex ante deviation from the securities market line depicting the error.

DESCRIPTORS: Portfolio performance; Performance evaluation; Capital assets; Pricing; Models; Benchmarks; Errors; Performance; Measurement; Risk; Portfolio management
CLASSIFICATION CODES: 3400 (CN=Investment analysis); 6200 (CN=Training & development)

...ABSTRACT: the estimate of risk in an unmanaged portfolio. The unmanaged portfolio is used as a benchmark in the evaluation of returns on a managed portfolio. One of the primary sources of error is the ex ante...

... performance as either better or worse than actual performance. The situation of better than actual performance will generally exist when the portfolio 's expected return is larger than the expected return of the market index, and vice...

... for detecting the existence of this type of error; it is based on estimating the beta factor and the slope of the portfolio locus. These factors are applied to an expected return...

DESCRIPTORS: Portfolio performance ;
800000

7/9,K/4 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

12143056 SUPPLIER NUMBER: 61531562 (THIS IS THE FULL TEXT)

Estimating Expected Returns for Developed Equity Markets.
ROY, LYNN D.
Journal of Investing, 9, 1, 53
Spring, 2000
ISSN: 1068-0896 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 3106 LINE COUNT: 00357

TEXT:

Research on global equity asset allocation tends to run in two veins. The first is the examination of strategies to predict expected returns, and the second is an inquiry into the optimization process that transforms expected returns, standards deviations, and correlations into optimal portfolio weights. (1)

Our research concerns itself primarily with the first objective, although the second is not completely ignored. Specifically, our goal is to forecast three-month country-level relative equity returns for the developed countries for use in tactical asset allocation. (2)

Toward this end, we follow in the footsteps of Kahn, Roulet, and Tajbakhsh (1996) and Asness, Liew, and Stevens (1997). We differ from this research by departing from the assumption that all equity market returns can be predicted using one model, and instead introduce idiosyncratic country models to predict expected equity returns. Recent literature indicates that this approach is warranted.

Chaumeton, Connor, and Curds (1996), for example, show that country-specific risk models explain about 35% of stock returns, while a global risk model explains about 21%. Similarly, Beckers, Connor, and Curds (1996) explain stock-level returns using country-level and global factors. They find that global influences and country level influences are of approximately equal importance. Both articles indicate that including country-specific factors is a wholly appropriate method to predict equity returns.

Additional rationale for exploiting country-level models is provided by Solnik, Bourcrelle, and Le Fur (1996), who study the correlations and volatilities of several European countries, the U.S., and Japan. They find that opportunities still exist to take advantage of international diversification because these countries' returns are not perfectly correlated. They state that the "fairly low levels of international correlation among stocks or bonds suggests that national factors still strongly affect local asset prices" (1996, p. 17).

METHODOLOGY

Our method to estimate expected returns is to build individual country-level models, and forgo an integrated global model. We assume there are three families of factors that may affect the equity return-generating process in each country. The specific form in each country is hypothesized to differ, as are the specific factors affecting each country.

We use several variables to measure each factor group.

Aggregate Company Fundamentals:

* IBES year-over-year growth in earnings.
* IBES earning revisions.
* Trailing P/E.
* Expected PIE.
* Price-to-cash flow.
* Expected earnings yield/short rate spread.
* Dividend yield.

Economic:

* Expected OECD GDP growth.
* Expected OECD export growth.
* Unemployment.
* CPI.
* Long-term interest rates.
* Short-term interest rates.
* Money supply.
* Term structure.
* Exchange rates.
* Political risk.

Technical:
* Market capitalization.
* Return volatility.
* Market turnover.
* Stock price movements, local currency and worldwide.

Erb, Harvey, and Viskanta (1995) provide interesting evidence for why several valuation measures may be needed across countries or even within a country. They examine country-level risk attributes, as measured by the country credit rating, and its ability to explain country-level valuation factors: price-to-book, dividend yield, and price-to-cash flow. In their pooled cross-country work, they find that credit ratings explain individual valuation factors to varying degrees. Credit rating, for example, explains price-to-book quite well, but not dividend yield. This leads us to conclude that valuation factors do not have interchangeable explanatory power, and we believe it is likely that the valuation factors have distinct predictive power in different countries.

From this general framework, we choose, for each country, the combination of variables that has the most power explaining three-month forward relative equity returns for the period ending December 1995. Relative returns are defined as MSCI U.S. dollar country-specific returns minus MSCI World index U.S. dollar returns. (The appendix provides a detailed example of the prediction procedure for one country in one period).

The procedure to predict returns is:

1. Compute parameter estimates using ordinary least squares (OLS) multivariate regressions, with a minimum of thirty months and maximum of sixty months of data, for each country.
2. Compute the country-specific predicted relative return as the sum of the most recent variable observation times its estimated parameter.
3. Roll the procedure forward one period, and repeat.

We thus obtain a time series of overlapping three-month period predicted relative returns for each of our twenty-one countries. (3)

Exhibit 1 shows the contribution to the forecast relative return for each factor group by country in the time period 1991-1998. We choose the beginning of 1991 as the starting point for the analysis because by that date the coverage for our model variables is generally quite good. Note that the contributions sum to one. For reference, the last column shows each country's average capitalization weight in the index of the twenty-one countries. For example, over the entire period 1991-1998 Australia averaged 1.2% of the twenty-one countries' total capitalization.

Exhibit 1 reveals a fairly wide range of factor-group contributions to forecast relative returns. For example, over time, U.S. forecasts are most heavily affected by the economic and technical factor groups. Conversely the forecasts for Japan are most heavily affected by the company fundamental factor group, weakly influenced by the technical factors, and not at all by economic factors. The forecasts for two of the smaller countries are a function of only one factor group. Denmark's model uses exclusively a combination of economic data, and Austria's uses only technical information to predict relative returns. The fact that these small countries do not have "even" representation across factors may reflect the quality of information available.

Note that the average and capitalization-weighted average factor contribution is fairly evenly distributed across the factor groups.

We should emphasize that the final models developed here, and summarized in Exhibit 1, are chosen for their ability to predict three-month forward relative equity returns in the 1991-1995 period. Other models could not meet this criterion. It is always possible to construct models that have representation in each factor, but it is our experience that these models do not do a better job of predicting relative returns. Of course, the models may work better only in our specific time period, which is why it is important to examine out-of-sample results.

Exhibit 2 displays for each country the "batting averages" (percent of times predicted and actual return are the same sign) of the time series of predicted and actual relative returns for the period 1991-1995 and 1996-1998, the fully out-of-sample period. This gives us a broad overview

of which country models work well. The acid test of our models, however, is a comparison of simulated portfolio returns to benchmark portfolio returns.

In Exhibit 2, the 1991-1995 batting averages range from 45% for Switzerland to 79% for Canada. The mean batting average of 65% indicates that on average the model predicts the correct sign of the actual relative return 65% of the time.

The higher capitalization-weighted average indicates that models for the larger countries have higher average batting averages than models for the smaller countries. For example, the large countries, Japan and the U.S., both have batting averages higher than the mean; hence we expect a capitalization-weighted average to be higher than the equal-weighted average.

Now consider the batting average results for 1996-1998. These range from 15% in the U.S. to 76% in the Netherlands. The mean of 50% indicates that, on average, our models predict the correct sign of the actual relative return about half the time. Although the 1996-1998 total averages aren't as high as the earlier period, several countries have higher batting averages in 1996-1998 than in the 1991-1995 period.

PORTFOLIO SIMULATION

To test the real-world effectiveness of our models, we introduce the predicted relative returns in a relative return/tracking error optimizer along with backward-compatible correlations, and standard deviations of returns, taking steps to ensure reasonable portfolio weights. (4) The output from the optimizer is a set of country weights that define our portfolio at each monthly rebalance date. Adapting from the work of Kahn, Roulet, and Tajbakhsh (1996), first we adjust the predicted returns for each country: (5)

Adj (R.sub.it) = (R.sub.it) x Scaled (IC.sub.it)

where Adj (R.sub.it) = adjusted raw predicted relative return; (R.sub.it) = raw predicted relative return; Scaled (IC.sub.it) = scaled information coefficient between predicted and actual returns; i = the country index; and t = time index.

To ensure reasonable portfolios, we place broad limits on the optimized portfolio weights at each rebalance. Specifically, each country has a maximum and minimum weight as follows:

Maximum Weight = Max(0.10, (1.5)Benchmark Weight)

Minimum Weight = Min(Max(Benchmark Weight - 0.10, 0), (0.5)Benchmark Weight)

Thus for small markets such as New Zealand, with an approximate benchmark weight of 0.1%, the portfolio bounds are between 0 and 10% of the portfolio. For larger markets such as Japan, with an approximate benchmark weight of 25%, the bounds are between 12.5% and 37.5% of the optimized portfolio. Note that these bounds also preclude short sales. In this work, our benchmark is the beginning-of-period capitalization-weighted portfolio of the twenty-one countries.

The actual optimization procedure uses relative returns and residual risk. That is, our objective function is of the form:

Maximize Utility = Expected Relative Return - (lambda)(Residual Variance)

where expected relative returns are estimated with our models; (lambda) defines risk aversion; and residual variance is the variance of (portfolio return minus benchmark return).

Exhibit 3 shows the summary portfolio results for the period 1991-1998, using several levels of risk tolerance, including turnover penalties. (7) First, note that in the 1991-1995 time period (Panel A), portfolio returns to the model range from 3.23% annually (with tracking error of about 1.5%) to 8.7% annually (with tracking error of about 3.7%). Clearly, in this time period, the models added value. The lower the risk aversion, the higher the returns, as we would expect. Observe the monotonicity of active returns and tracking error: Higher levels of risk tolerance are associated with higher returns and higher tracking error. The months of outperformance column presents evidence that active returns are not concentrated in a few months, but are dispersed over the time period.

Panel B provides results for the fully out-of-sample period 1996-1998. The same general pattern that emerges in 1991-1995 is seen here.

Generally, higher levels of risk aversion result in lower returns and turnover. Annualized active returns are lower in this period than in the prior period, but the months of outperformance results are in line with the earlier outcomes.

To provide additional insight into portfolio composition, Exhibit 4 shows information on average, maximum, and minimum active weights in 1991-1998 for moderate risk aversion. On average, the countries with the highest average underweights are Japan, the U.S., and Canada. The countries with the highest average active overweights are Italy, Germany, and France. Exhibit 4 reveals that, for this level of risk tolerance, the portfolio has reasonable deviations from benchmark weights.

Our analysis thus far has concentrated exclusively on portfolio performance including our twenty-one individual models. Exhibit 5 shows optimization results for just the G-7 countries (Canada, France, Germany, Italy, Japan, the U.K., and the U.S.) in an equity asset allocation program. Again we see that attractive active returns can be achieved at reasonable levels of tracking error and turnover in both the 1991-1995 and 1996-1998 periods.

It is also possible to combine the country-level predicted returns into regional returns, which may then be used in an optimization routine. Portfolio managers might want to allocate equity assets to three regions: the Pacific Rim (Australia, Hong Kong, Japan, New Zealand, and Singapore); North American (Canada and the U.S.); and Europe (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, and the U.K.). Regional adjusted returns are calculated by capitalization-weighting the individual country forecast relative adjusted returns:

Regional Adj Pred (Ret.sub.t) = (((sigma).sup.N).sub.1) Pred (Ret.sub.it) X Regional (weight.sub.it)

where N is the number of countries in the region.

Exhibit 6 shows the results of this strategy. In the in-sample period, results are again strong. In the out-of-sample period 1996-1998, however, the models fail to achieve desired results.

SUMMARY

Our country-specific models predict relative equity returns quite well. The resulting active portfolio returns are in the 0.5%-7.0% range, depending on the risk level and turnover one is willing to accept. These results are robust to inclusion of the fully out-of-sample period 1996-1998. When we test the effectiveness of the models in more limited settings for the G-7 countries or regional relative returns, both strategies produce acceptable in-sample active returns at reasonable levels of tracking error and turnover. Out-of-sample results are not as robust.

LYNN D. ROY is director of research at Vestek Systems in San Francisco. Prior to joining Vestek, she was a manager of research and quantitative analysis at Prudential Diversified Investment Strategies and taught at Brooklyn College and Rutgers University. Ms. Roy holds M.B.A. and Ph.D. degrees from Rutgers University.

ENDNOTES

(1.) For examples of the first, see Kahn, Roulet, and Tajbakhsh (1996) and Asness, Liew, and Stevens (1997). For a well-known example of the second, see Black and Litterman (1992).

(2.) Throughout this work, relative returns are defined as the U.S. dollar-denominated country-level equity return minus the U.S. dollar-denominated world return.

(3.) While the model variables are chosen using the time period ending December 1995, the predicted returns calculated in that same time period do not have a "look-ahead" bias because our simulation is constructed so that each predicted return uses only data available before the start of the prediction period.

(4.) By "backward-compatible," we mean correlations and standard deviations that are known as of the rebalance date, with no look-ahead bias.

(5.) This takes advantage of the information in prior estimated expected returns.

(6.) Specifically: Scaled IC = cov(predicted, actual)/var(predicted).

(7.) We also investigated simulations excluding a turnover penalty not presented here. These simulations result in higher returns and correspondingly higher turnover.

REFERENCES

Asness, Cliff S., John M. Liew, and Ross L. Stevens. "Parallels Between the Cross-Sectional Predictability of Stock and Country Returns." Journal of Portfolio Management, Spring 1997, pp. 79-87.

Beckers, Stan, Gregory Connor, and Ross Curds. "National versus Global Influences on Equity Returns." Financial Analysts Journal, March/April 1996, pp. 31-39.

Black, Fischer, and Robert Litterman. "Global Portfolio Optimization." Financial Analysts Journal, September/October 1992, pp. 28-43.

Chaumeton, Lucy, Gregory Connor, and Ross Curds. "A Global Stock and Bond Model." Financial Analysts Journal, November/December 1996, pp. 65-74.

Erb, Claude, Campbell Harvey, and Tadas Viskanta. "Inflation and World Equity Selection." Financial Analysts Journal, November/December 1995, pp. 28-42.

Kahn, Ronald N., Jacques Roulet, and Shahram Tajbakhsh. "Three Steps to Global Asset Allocation." Journal of Portfolio Management, Fall 1996, pp. 23-31.

Solnik, Bruno, Cyril Boucrelle, and Yan Le Fur. "International Market Correlation and Volatility." Financial Analysts Journal, September/October 1996, pp. 17-34.

Factor Contribution to Forecast Returns by Country (%)

Country	Economic Factors	Company Fundamental Factors	Technical Factors	Index Weight December 31, 1998
Australia	37	20	43	1.2
Austria	0	0	100	0.2
Belgium	22	41	37	0.9
Canada	72	0	28	1.8
Denmark	100	0	0	0.4
Finland	75	0	25	0.7
France	29	28	43	4.4
Germany	45	0	55	5.0
Hong Kong	35	65	0	1.0
Ireland	27	0	73	0.2
Italy	4	52	44	2.5
Japan	0	84	16	9.9
Netherlands	0	58	42	3.1
New Zealand	56	29	14	0.1
Norway	55	0	45	0.2
Singapore	0	64	36	0.3
Spain	23	0	77	1.6
Sweden	0	62	38	1.2
Switzerland	74	0	26	3.8
U.K.	35	16	50	10.4
U.S.	44	13	44	51.0
Average	35	25	40	
Cap-Wtd Average	36	23	41	

Descriptive Statistics: Country-level Models (%)

Country	Batting Average 1991-1995	Batting Average 1996-1998	Index Weight December 31, 1998
Australia	72	50	1.2
Austria	68	53	0.2
Belgium	51	41	0.9
Canada	79	53	1.8
Denmark	59	65	0.4
Finland	67	41	0.7
France	63	53	4.4
Germany	68	53	5.0
Hong Kong	61	59	1.0
Ireland	56	44	0.2
Italy	70	44	2.5

Japan	67	47	9.9
Netherlands	56	76	3.1
New Zealand	71	29	0.1
Norway	68	29	0.2
Singapore	63	41	0.3
Spain	69	62	1.6
Sweden	60	59	1.2
Switzerland	45	65	3.8
U.K.	70	62	10.4
U.S.	74	15	51.0
Average	65	50	
Cap-Wtd Average	70	35	

Portfolio Simulation Summary

Risk Aversion	Annualized Active Return	Months of Outperformance	Approximate Annual Tracking Error
Panel A: 1991-1995			
1 low	8.71%	75%	3.73%
2	5.83%	68%	2.51%
3	3.87%	63%	1.63%
4 high	3.23%	70%	1.45%
Panel B: 1996-1998			
1 low	1.91%	61%	1.95%
2	2.56%	58%	1.53%
3	2.29%	58%	1.20%
4 high	1.25%	61%	1.24%

Risk Aversion	Average Annual Portfolio Turnover (times)
Panel A: 1991-1995	
1 low	2.41
2	1.99
3	1.53
4 high	1.39
Panel B: 1996-1998	
1 low	2.48
2	2.02
3	1.72
4 high	1.51

Average, Maximum, and Minimum Weights -- Moderate Risk Tolerance 1991-1998 (%)

Country	Average Active Weight	Maximum Active Weight	Minimum Active Weight
Australia	0.09	6.67	-1.87
Austria	0.02	0.99	-0.02
Belgium	0.19	4.98	-0.03
Canada	-1.21	7.52	-3.09
Denmark	-0.41	-0.31	-0.53
Finland	0.99	6.97	-0.10
France	3.04	9.54	-0.75
Germany	1.71	5.97	-1.44
Hong Kong	-0.61	2.00	-2.92
Ireland	-0.26	-0.18	-0.45
Italy	1.47	8.00	0.00
Japan	-1.99	2.53	-5.47
Netherlands	1.45	9.05	-1.70
New Zealand	-0.06	1.84	-0.26
Norway	-0.25	1.65	-0.38
Singapore	-0.68	3.26	-1.24
Spain	0.24	2.99	-0.01
Sweden	-0.22	2.88	-1.66
Switzerland	-0.56	8.08	-3.16
U.K.	-0.04	5.88	-7.16
U.S.	-3.37	5.64	-20.02

G-7 Country Portfolio Simulation

	Annualized Active Return	Months of Outperformance	Approximate Annual Tracking Error
Panel A: 1991-1995			
Risk Aversion			
1 low	7.46%	63%	4.23%
2	6.26%	72%	3.08%
3	4.33%	72%	2.35%
4 high	3.28%	72%	2.04%
Panel B: 1996-1998			
1 low	0.77%	50%	2.45%
2	1.29%	61%	1.49%
3	1.53%	67%	1.02%
4 high	0.33%	53%	1.21%

	Average Annual Portfolio Turnover (times)
Panel A: 1991-1995	
Risk Aversion	
1 low	2.71
2	1.90
3	1.45
4 high	1.22
Panel B: 1996-1998	
1 low	2.90
2	1.83
3	1.32
4 high	1.13

Three Region Portfolio Simulation

	Annualized Active Return	Months of Outperformance	Approximate Annual Tracking Error
Panel A: 1991-1995			
Risk Aversion			
1 low	5.45%	62%	2.89%
2	5.31%	65%	2.60%
3	4.79%	65%	2.33%
4 high	3.59%	67%	1.88%
Panel B: 1996-1998			
1 low	-2.11%	42%	1.95%
2	-1.30%	44%	1.52%
3	-0.60%	47%	1.20%
4 high	0.11%	50%	0.95%

	Average Annual Portfolio Turnover (times)
Panel A: 1991-1995	
Risk Aversion	
1 low	1.93
2	1.55
3	1.38
4 high	1.06
Panel B: 1996-1998	
1 low	2.17
2	1.62
3	1.39
4 high	1.14

APPENDIX

Prediction Procedure Example

For one country and one time period, the three months April, May, and June 1995, assume the model consists of the four variables:

IR (interest rates);

P/E;

GDP; and

GRO (earnings growth).

These are used to forecast the relative return defined as: MSCI U.S. dollar country-specific returns minus MSCI World index U.S. dollar returns.

The prediction steps are:

1. Estimate the OLS regression:
(R.sub.t) = ((beta).sub.0) + ((beta).sub.1)(IR.sub.t) + ((beta).sub.2)(PE.sub.t) + ((beta).sub.3)(GDP.sub.t) + ((beta).sub.4)(GRO.sub.t) + e
where ((beta).sub.0)-((beta).sub.4) are parameters to be estimated, and e is an error term.
(R.sub.t) is the time series of sixty overlapping three-month-ahead relative returns beginning with the three-month return February-March-April 1990, and ending with the three-month return January-February-March 1995.
The explanatory variable time series of sixty observations begins with the values of IR, P/E, GDP, and GRO available as of January 31, 1990, and ends with the values available as of December 31, 1994.
This regression yields parameter estimates ((beta).sub.0)-((beta).sub.4)
2. Compute the predicted return for April-May-June 1995:
Pred R = ((beta).sub.0) + ((beta).sub.1)IR + ((beta).sub.2)PE + ((beta).sub.3)GDP + ((beta).sub.4)GRO
where Pred R is the predicted return for April-May-June 1995, and all explanatory variable values are as of March 31, 1995.
This predicted relative return then does not have a look-ahead bias, since it is based only on data available at the beginning of the prediction period.

INDUSTRY CODES/NAMES: BANK Banking, Finance and Accounting; BUSN Any type of business

... work well. The acid test of our models, however, is a comparison of simulated portfolio returns to benchmark portfolio returns .
In Exhibit 2, the 1991-1995 batting averages range from 45% for Switzerland to 79...

...with our models; (lambda) defines risk aversion; and residual variance is the variance of (portfolio return minus benchmark return).
Exhibit 3 shows the summary portfolio results for the period 1991-1998, using several levels...

...portfolio has reasonable deviations from benchmark weights.
Our analysis thus far has concentrated exclusively on portfolio performance including our twenty-one individual models. Exhibit 5 shows optimization results for just the G...t) + ((beta).sub.3)(GDP.sub.t) + ((beta).sub.4)(GRO.sub.t) + e
where ((beta).sub.0)-((beta).sub.4) are parameters to be estimated, and e is an error term.
(R.sub.t) is the time...

...1990, and ends with the values available as of December 31, 1994.
This regression yields parameter estimates ((beta).sub.0)-((beta).sub.4)
2. Compute the predicted return for April-May-June 1995:
Pred R = ((beta...

20000322

7/9,K/5 (Item 1 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

03660831 (THIS IS THE FULLTEXT)
SOFTWARE/DATABASES
PENSIONS & INVESTMENTS, p29
November 30, 1998
JOURNAL CODE: WCPI LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 709

On-Site

SunGard Portfolio Solutions Inc.

This global accounting and performance system does real-time, in-house portfolio management and double-entry accounting reporting. It includes multi-currency accounting, fixed-income processing, segment-level AIMR-compliant performance tools, three-tier commission tracking and unlimited portfolio and security classification schemes.

There are 100 users.

It runs on UNIX and Windows NT, with updates via CD.

The system is targeted at operations and analysts.

The client contact is Pam Pecs Cytron.

Port

SunGard Portfolio Solutions Inc.

This portfolio management and performance measurement system does comprehensive portfolio management and accounting with an open path to access and maximize data, using report writers such as Crystal Reports or spreadsheets. It uses browser-based technology and key features include client reporting, management information, performance measurement, client billing, order entry and trading, system administration and maintenance.

There are 600 users.

It runs on Windows NT, with updates via CD.

The system is targeted at traders, analysts, portfolio and operations managers.

The client contact is Pam Pecs Cytron.

Portfolio One

SunGard Portfolio Solutions Inc.

This portfolio management and performance measurement system does global portfolio management and performance measurement. Information is presented using browser-based technology. The integrated trading system offers user-defined reports, and front to back office.

There are 4,400 users.

It runs on remote service, Windows 95 and NT.

The system is targeted at portfolio managers, operations, traders, sales and marketing.

The client contact is Pam Pecs Cytron.

Verify

SunGard Portfolio Solutions Inc.

This automated reconciliation and reporting system streamlines reconciling positions and transactions with custodian records and manages the entire reconciliation workflow.

There are 50 users.

It runs on Windows 95 and Windows NT, with updates via CD.

The system is targeted at account administrators and operations.

The client contact Pam Pecs Cytron.

QuantVision

Team Systems

This equity valuation and backtesting system provides data warehousing and analytical tools and guides for constructing, backtesting and implementing proprietary valuation models. It includes factor definition, multi-factor modeling, cross-sectional regressions, alpha forecasting and portfolio simulations.

The cost is $30,000 annually; there are six users.

It runs on Windows 95 and NT, with updates via CD and the Internet.

The system is targeted at equity portfolio managers and analysts.

The client contact is Andrew Balogh.

The Index and Structured Manager

Vestek Systems

This portfolio construction and management optimization system runs a full spectrum of passive and active stratagies; services include optimizers, data on index composition and the securities market, and an electronic interface with major brokers to transfer data on trade lists; can be used for single country, regional, and global index funds, funds that tilt toward structural factors and funds with active stock selection overlays.

It runs on Windows, with online updates.
The system is targeted at portfolio managers.
The client contact is Keith Webster.
Multifactor Stock Selection
Vestek Systems
This stock selection system evaluates the attractiveness of U.S. and international securities. Clients use factors singly or in combination to study the performance of factors over time and analyze portfolio exposures to these factors relative to a selected benchmark.
It runs on Windows, with on-line updates.
The system is targeted at portfolio managers.
The client contact is Keith Webster.
The Portfolio Analyzer
Vestek Systems
This portfolio management, equity analytics and performance attribution system evaluates portfolio risk and return. Analytic solutions show portfolio performance relative to a benchmark and identify deviations from investment objectives. The system reviews portfolio holdings, uncovers sources of risk and attributes performance to specific factors and provides reports and graphs illustrating results.
It runs on Windows, with online updates.
The system is targeted at portfolio managers, plan sponsors, mutual funds, marketing executives, investment consultants and fund distributors.
The client contact is Keith Webster.
The Wilshire Abacus
Wilshire Associates Inc.
This investment accounting, portfolio management and performance measurement system does Y2K compliant investment accounting/performance measurement.The workstation provides custodian bank reconciliation, automated trade entry and ad hoc query and reporting capabilities; support for multi-currency portfolios; flexible data entry and export; scheduling; and report writers that display in tabular and graphical formats.
The cost is $50,000 to $500,000 annually. There are 20 users.
It runs on Windows NT, Windows 95, Windows 98, and OS/2, with updates via Internet and modem.
The system is targeted at portfolio managers, back-office personnel, traders and client service.
The client contact is Dan Anderson.

DESCRIPTORS: Science & Technology; General News
COUNTRY NAMES/CODES: United States of America (US)
REGIONS: Americas; North America; Pacific Rim
SIC CODES/DESCRIPTIONS: 7372 (Prepackaged Software)

(USE FORMAT 7 OR 9 FOR FULLTEXT)

This global accounting and performance system does real-time, in-house portfolio management and double-entry accounting reporting. It includes multi-currency accounting, fixed-income processing, segment-level AIMR-compliant performance tools, three-tier commission tracking and unlimited portfolio and security classification schemes.
There are 100 users.
It runs on UNIX and Windows NT...

...is targeted at operations and analysts.
The client contact is Pam Pecs Cytron.
Port
SunGard Portfolio Solutions Inc.
This portfolio management and performance measurement system does comprehensive portfolio management and accounting with an open path to access and maximize data, using report writers...

...analysts, portfolio and operations managers.

The client contact is Pam Pecs Cytron.

Portfolio One

SunGard Portfolio Solutions Inc.

This portfolio management and performance measurement system does global portfolio management and performance measurement. Information is presented using browser-based technology. The integrated trading system offers user-defined...

... and analytical tools and guides for constructing, backtesting and implementing proprietary valuation models. It includes factor definition, multi- factor modeling, cross-sectional regressions, alpha forecasting and portfolio simulations.

The cost is $30,000 annually; there are six users.

It...

... U.S. and international securities. Clients use factors singly or in combination to study the performance of factors over time and analyze portfolio exposures to these factors relative to a selected benchmark.

It runs on Windows, with on...

...at portfolio managers.

The client contact is Keith Webster.

The Portfolio Analyzer

Vestek Systems

This portfolio management, equity analytics and performance attribution system evaluates portfolio risk and return . Analytic solutions show portfolio performance relative to a benchmark and identify deviations from investment objectives. The system reviews portfolio holdings, uncovers sources of risk and attributes performance to specific factors and provides reports and graphs illustrating results.

It runs on Windows, with...

...The client contact is Keith Webster.

The Wilshire Abacus

Wilshire Associates Inc.

This investment accounting, portfolio management and performance measurement system does Y2K compliant investment accounting/performance measurement.The workstation provides custodian bank reconciliation...

19981130

?

```
SHOW FILE
File  15:ABI/Inform(R) 1971-2003/Sep 06
         (c) 2003 ProQuest Info&Learning
File   9:Business & Industry(R) Jul/1994-2003/Sep 05
         (c) 2003 Resp. DB Svcs.
File 610:Business Wire 1999-2003/Sep 05
         (c) 2003 Business Wire.
File 810:Business Wire 1986-1999/Feb 28
         (c) 1999 Business Wire
File 275:Gale Group Computer DB(TM) 1983-2003/Sep 05
         (c) 2003 The Gale Group
File 476:Financial Times Fulltext 1982-2003/Sep 08
         (c) 2003 Financial Times Ltd
File 624:McGraw-Hill Publications 1985-2003/Sep 05
         (c) 2003 McGraw-Hill Co. Inc
File 636:Gale Group Newsletter DB(TM) 1987-2003/Sep 05
         (c) 2003 The Gale Group
File 621:Gale Group New Prod.Annou.(R) 1985-2003/Sep 05
         (c) 2003 The Gale Group
File 613:PR Newswire 1999-2003/Sep 07
         (c) 2003 PR Newswire Association Inc
File 813:PR Newswire 1987-1999/Apr 30
         (c) 1999 PR Newswire Association Inc
File  16:Gale Group PROMT(R) 1990-2003/Sep 05
         (c) 2003 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
         (c) 1999 The Gale Group
File 634:San Jose Mercury  Jun 1985-2003/Sep 05
         (c) 2003 San Jose Mercury News
File 148:Gale Group Trade & Industry DB 1976-2003/Sep 05
         (c)2003 The Gale Group
File  20:Dialog Global Reporter 1997-2003/Sep 07
         (c) 2003 The Dialog Corp.
?
```

```
Set      Items    Description
S1       58547    PORTFOLIO?(7N)PERFORMANCE?
S2       11654    BENCHMARK?(9N)RETURN?
S3        1475    S1 AND S2
S4       22656    (ALPHA OR BETA)(7N)(COEFFICIENT? OR VARIABLE? OR FACTOR? OR
                 PARAMETER?)
S5         111    S3 AND S4
S6    18183860    PD<20000711
S7           5    S5 AND S6
?
```

```
Set       Items   Description
S1        58547   PORTFOLIO?(7N)PERFORMANCE?
S2        11654   BENCHMARK?(9N)RETURN?
S3         1475   S1 AND S2
S4        22656   (ALPHA OR BETA)(7N)(COEFFICIENT? OR VARIABLE? OR FACTOR? OR
                PARAMETER?)
S5          111   S3 AND S4
S6     18183860   PD<20000711
S7            5   S5 AND S6
S8          694   PORTFOLIO?(7N)PERFORMANCE?
S9          157   BENCHMARK?(9N)RETURN?
S10          35   S8 AND S9
S11       33123   (ALPHA OR BETA)(7N)(COEFFICIENT? OR VARIABLE? OR FACTOR? OR
                PARAMETER?)
S12           5   S10 AND S11
S13     4661664   PD<20000711
S14           0   S12 AND S13
?
```

```
SHOW FILE
File  35:Dissertation Abs Online 1861-2003/Aug
         (c) 2003 ProQuest Info&Learning
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
         (c) 2002 The Gale Group
File  65:Inside Conferences 1993-2003/Aug W5
         (c) 2003 BLDSC all rts. reserv.
File 233:Internet & Personal Comp. Abs. 1981-2003/Jul
         (c) 2003, EBSCO Pub.
File 474:New York Times Abs 1969-2003/Sep 06
         (c) 2003 The New York Times
File 475:Wall Street Journal Abs 1973-2003/Sep 05
         (c) 2003 The New York Times
File  99:Wilson Appl. Sci & Tech Abs 1983-2003/Jul
         (c) 2003 The HW Wilson Co.
File 256:SoftBase:Reviews,Companies&Prods. 82-2003/Aug
         (c)2003 Info.Sources Inc
File 348:EUROPEAN PATENTS 1978-2003/Aug W05
         (c) 2003 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20030904,UT=20030828
         (c) 2003 WIPO/Univentio
File 347:JAPIO Oct 1976-2003/May(Updated 030902)
         (c) 2003 JPO & JAPIO
?
```